

REMARKS

The 35 U.S.C. § 103(a) rejections of Claims 1-16 have been carefully considered. Claims 1-14 (of which only Claim 1 is in independent form) have been amended to limit their coverage to an artificial hair consisting of a flame retardant polyester fiber and Claims 15 and 16 have been cancelled. New dependent Claims 17 and 18 are limited in the same way. For the reasons hereinafter set forth, it is respectfully submitted that amended Claim 1 (and, thus, Claims 2-14, 17 and 18) defines subject matter which is neither described nor suggested by any of the references relied upon by the Examiner, JP Pat. No. 61-245309, JP Pat. No. 10-219519, Endo et al, Kyo et al, Munday et al, or Hobbs et al, alone or in any combination.

The invention of amended Claim 1 is an artificial hair consisting of a flame-resistant polyester fiber. The flame-resistant polyester comprises the polyester (A) consisting of one or more kinds of copolymerized polyesters having polyalkylene terephthalates and polyalkylene terephthalates as principal components; a phosphorus based flame resistant agent (C), and a phosphate based compound (D), wherein the phosphate based compound component (D) is at least one kind selected from a group consisting of trialkylphosphites, triallyl phosphates, alkyl allyl phosphates and phosphate based compounds represented by the general formula (9) or (10).

The claimed artificial hair provides excellent flame retardancy, a drip-proof property at the time of combustion and a setting property, while maintaining textile physical properties such as flame-resistance and strong ductility of the usual polyester fiber. The drip-proof property at the time of the combustion and the setting property present inherent problems in conventional artificial hair.

The flame-resistant polyester fiber based artificial hair of the present invention has the filament fineness of 30 – 70dtex, and its fiber diameter is thicker than the usual textiles. Generally, for a polyester fiber with a thick fiber diameter, it is difficult to improve its drip-proof property at the time of combustion securing the flame retardancy, i.e., compared with usual polyester fiber. Therefore, the composition constitution and the manufacturing method of usual polyester fiber are not simply applicable thereto.

In the present invention, since a polymer alloy (B) is micro-dispersed in polyester (A) and the dispersion stability is improved by using the polymer alloy (B) of polyalkylene terephthalate and polyarylate, the compatibility of polyester (A) and polyarylate is improved. Therefore, without adjusting to a specific melting condition, compatibility can be improved, unlike the case where only polyarylate is independently blended to polyester (A). By micro-dispersion and improvement of the dispersion stability of a polymer alloy (B), melt viscosity becomes high and the drip-proof property at the time of combustion is also improved in polyester fiber with a thick fiber diameter. Moreover, by micro-dispersion and improvement of the dispersion stability of a polymer alloy (B), it also becomes easy to adjust the gloss of fiber surface.

In contrast, the cited reference JP61-245309 discloses the polyester fiber which consists of polyalkylene terephthalate, polyarylate, phosphate compound, and other common additives including general flame retardant. However, it discloses, for example as shown by Embodiments 1-7, a usual thin fiber having 75d/16f (fineness of 4.6 deniers [5.2dtex] per filament). Also, a drip-proof property at the time of the combustion and a setting property of artificial hair are neither described nor suggested.

The reference JP10-219519 discloses a polyester fiber containing a specific organic phosphorous compound and polyphenylene ether provided with a high flame retardancy.

The Endo et al reference discloses a phosphorus containing compound having a specific reactivity in order to solve problems arising at the time of manufacturing polyester, problems such as degradation of catalytic activity, forming an ether linkage etc., instead of using general phosphoric ester or phosphite compound.

However, none of these three references teach or suggests the combination of limitations (A)+(B)+(C)+(D) in Claim 1. Moreover, the artificial hair of the present invention produces superior effects resulting in superior physical properties such as improvement of elongation, superior flame retardancy (especially drip-proof property), as well as the outstanding setting property. The fact that these effects could be obtained would plainly not have been obvious to a person having ordinary skill in the art in view of these three references cited by the Examiner.

Regarding the Kyo et al reference, it discloses that various additives such as a phosphate based anti-oxidant and other resins such as a polyalkylene terephthalate (PET, PBT) can be added to a resin composition consisting of polyarylate and phosphoric acid ester compound. However, Kyo et al is related to a molded article, not artificial hair and does not teach or suggest improvement of the drip-proof property at the time of combustion and the setting property for an artificial hair.

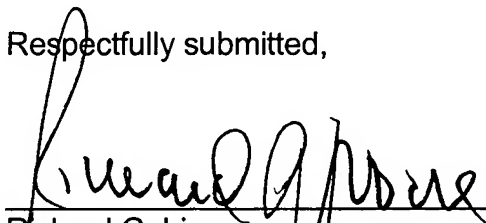
Regarding the Munday et al reference, it simply discloses a polyester fiber containing a phosphorus reactant obtained from a mixture of terephthalic acid or dimethyl terephthalate, ethylene glycol, a chain branching agent, and a phosphinic acid containing a phosphorus reactant shown by an applicant's general formula (3).

Regarding the Hobbs et al reference, it simply teaches that pentaerythritol phosphate flame retardant is capable of giving flame retardancy or anti-oxidization ability to a polyester.

However, none of these four references describe or suggest the claimed combination of elements (A)+(B)+(C)+(D) in artificial hair. As such, applicants submit these references could not have made the invention of Claim 1 obvious.

Applicants submit that independent Claim 1 defines unobvious subject matter and, accordingly, should be allowable. Claims 2-14, 17 and 18 depend from it and, as a result, should also be allowable.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Richard G. Lione", written over a horizontal line.

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